

5385, Indianapolis Public Schools

PROJECT ABSTRACT

Students at four Indianapolis Public School high schools and three non public High Schools will participate in a problem-based learning technology, enrichment class. This class is Integrated Chemistry and Physics (ICP) and contains at-risk students who took science in 7th and 8th grade and received a C- or less in the course. ICP students will participate in this project from (Emmerich Manual, Arsenal Technical, NorthWest and Arlington) Non Public includes, (Ritter High School, Trinity Christian School, and Providence Cristo Rey High School). This grant opportunity will allow students in ICP to participate in real-world applications as it relates to Chemistry and Physics. The Problem-Based Learning (PBL) unit will serve as the underlying teaching pedagogy in these four IPS classrooms. PBL leaves a natural setting for the use of technology integrated into the state academic standards. Students will have access to the latest technology in the classroom to do research and create the final solution to the class and community involved. The students will do a mini PBL in the fall of 2010 and a larger PBL unit in the spring of 2011. Students will present to the audience in which their PBL is designed in a formal setting called the collaboration dinner. The PBL will be lead and facilitated by the classroom teacher. Students will work together to determine the problem to solve. The unit must include state standards in science. Students who choose forensic science will use an inquiry approach along with the latest technology in the classroom to determine how to solve the problem that has been presented. These students who have been labeled at-risk will be actively engaged in real science applications through PBL strategies with access to a variety of technologies that will enable them to research, manage, create collaborate, communicate prioritize, and become higher order thinkers with sound reasoning. All of these are 21 century skills according to Cheryl Metiri who conducted the research to identify the skill set that would be needed by workers in the 21st Century. This project has an extensive professional development component for PBL and technology integration. The proposed district strategic plan for 2010 & 2012 calls for the implementation of Problem-Based Learning instruction and technology benchmarks. The teachers participating in this project will have the background and experience in these areas to become role models in their schools to assist in the implementation of the proposed strategic plan. An external evaluator will conduct a formal evaluation. District benchmarks will be used as well as surveys and interviews with teachers, staff and students.

NEEDS/BASELINE

Students at four Indianapolis Public School high schools (Emmerich Manual, Arsenal Technical, NorthWest and Arlington) will participate in a problem-based learning/ technology/enrichment class. This class is Integrated Chemistry and Physics (ICP). ICP students will partner with four IPS school as well as Ritter High School, Trinity Christian School, and Providence Cristo Rey High School non public school.

According to data from the IPS Office of Student Assignments (07-08), 72% of our schools did not make Annual Yearly Progress (AYP). 77% of our students do not take the SAT. 58% of the students drop out of high school. 82% of our students are on free and reduced lunch. Our mobility rate is 65%. The at-risk

students who will be participating in the four ICP courses took science in 7th and 8th grade and received a C- or less in the course.

In these schools less than 30% of these students do not have Internet access at home. Many of these students never have an opportunity to leave the community in which they live. Students in the inner city do not have the same experiences as their counterparts in the townships and surrounding counties, making real world experiences extinct. It is evident that reform is needed to improve student achievement in STEM content and curriculum. The funding from this grant will provide the resources needed to increase student learning and engagement through the use of technology.

GOALS/OBJECTIVES

Goal: 50% of the Ninth grade students in the four participating high schools integrated Chemistry and Physics (ICP) course will meet 75% mastery, based on the established district benchmark acuity.

Objective 1: 100% of the Ninth grade students will implement Problem-Based Learning (PBL) units in their classroom. One mini-unit will be created in the fall of 2010 and a more in-depth unit will be created in the spring of 2011. Student outcomes and learning will be assessed and measured based on a rubric that includes Indiana Academic Standards, School Improvement Plan and school technology plan. View at: <http://rubistar.4teachers.org>. Rubric ID # 1832813

Objective 2: 90% of the participating students will master the National Educational Technology Standards for ninth grade students, based on a pre and post on-line assessment.

Objective 3: 100% of the participating students in the four high schools will increase their proficiency in scientific thinking by 75%, as measured by 21st Century Skills set rubric.

Objective 4: Student attendance will increase by 50% by the end of the first semester and 75% by the end of the second semester.

Objective 5: 100% of the teachers will use the I-STEM Resource Network website to implement high academic standards towards STEM literacy.

METHODS/ACTIVITIES

Curriculum will be based on the Indiana Science Standards for Integrated Chemistry and Physics.

A) Problem-Based Learning Framework:

The four participating schools in this project will be using a Problem-Based Learning (PBL) framework in order to make instruction more student-centered, authentic and technology-infused. In PBL, teachers coach students as they identify a community issue, research it (using the Internet, distance learning connections, webinars, iChat, Skype, and personal interviews, among other resources), and create presentations, which include recommendations for action.

Students will begin with small-scale problem-based learning units. These are short-term projects that address a limited number of standards, in order to allow teachers and students to get comfortable with new strategies, high tech resources and classroom management techniques. Teachers will receive steady support from coaches during these initial attempts in the first semester.

As teachers become more comfortable with student-focused inquiry, they will progress to longer-term units incorporating several standards and more high-tech learning resources. Students will assume more control of the investigations. Coaches will also be available throughout these full-blown PBL lessons, to assist teachers with their content, strategy, technology, or assessment needs.

B) Science Instructional Strategies:

1. Structured Observations: Students will develop quality writing when describing what they observe using prompts that identify important characteristics. An observation rubric is used for grading.

2. Verbal Interactions: Student verbalization of what they know and understand is strengthened and deepened. They become central to instruction when the teacher is questioning. Teacher implements elements of inquiry when they are questioning.

3. Concept Development: Understanding the characteristics of important concepts are critical to development of scientific understanding of ideas. The depth of understanding is increased over that achieved through vocabulary strategies. Increased long-term knowledge of concepts allows application throughout the year.

4. Exploration/Investigation: Exploration is the essence of scientific discovery. Students model the role of the scientist. Higher-level thinking is essential to complete. The discovery nature engages students in the thinking without prodding. Teachers provide stimulus material and pose a question to explore or resolve. Students work through a structured process to recall their prior knowledge of scientific content and apply it to the solution of the problem.

C) District provided iPods will be used to enhance the science curriculum as well as using apps to research, take notes, use as study guides, and to take quizzes and tests.

D) 21st Century Classroom: A rich technology environment is necessary for creating a PBL classroom that enlists 21st century learning. Teachers and students will be engaged in this classroom by having interactive white boards for meaningful dialogue and discussion. Student response systems will allow for accurate and timely surveys and questions. Laptops from the grant and from the district will account for a 1:1 solution for the ICP classroom giving students optimum research and production skills to reach mastery in the National Educational Technology standards as required by our district technology plan and NCLB.

E) End of year collaboration:

Final presentations by students will include principals, parents, community partners, and community business leaders, school board members and educational leaders. Students will formally present their PBL unit in the form of a Keynote or PowerPoint presentation including their driving question, data collection, analysis, and solutions. After formal presentations, students will be available in a less formal setting to interact with guests and answer questions.

PROFESSIONAL DEVELOPMENT

Professional development will be implemented in several formats: Summer institute, online courses, and just in time training with Job coaches.

1. One week intensive summer seminar. During the week of June 2010 participating ninth grade teachers, science facilitators, media specialists, administrators, and the new IPS digital coach will:

A) Review the 9th grade vocabulary, reading comprehension and scientific thinking standards and performance by 8th grade students from their schools in these areas on the spring ISTEP and district benchmarks.

B) Work with content experts to study research and learn strategies for problem-based learning, technology, and scientific thinking.

C) Develop problem-based learning units that address Integrated Chemistry and Physics standards, the National Educational Technology Standards, and proposed district strategic plan.

D) Quarterly Seminars: Grade 9 teachers and science facilitators will attend two all-day seminars. One on October 8th, 2010 and the other in the spring of 2011 and two after-school sessions, where they will continue to work with content experts and technology coaches to plan and implement problem-based learning units integrating scientific literacy and ICP standards.

2. Job-embedded coaching for individual teachers and small groups: a full time digital coach will fill the internal coaching role. This digital coach will be a teacher hired from a previous grant that included PBL, technology and science with expertise in PBL and technology integration. This position will be the lead contact in the project. This person will coordinate and attend the summer institute as well as the fall, spring, and after-school professional development sessions. This person will work alongside the participating teachers, participate in the distance learning and IPS Online discussions, and help teachers in their classrooms as they gather and study student data, plan and initiate problem-based learning units, and facilitate students as they use technology to create products. Monica Cougan, PBL expert from the Center for Interactive Learning and Collaboration (CILC) will take the lead external consultant role, bringing in content experts to assist teachers with specific technology and science content as needs arise. The time line will call for weekly contact with every teacher.

3. Intensive Professional Development for Principals:

A) In October, content experts will make presentations on PBL, scientific thinking and literacy and technology. With support from the digital coach and the district science content facilitators, principals will learn strategies to evaluate teachers using technology and PBL.

B) Communication with Colleagues, supported by Distance Learning and IPS Online, Web 2.0: Principals, teachers, community partners and other supporting teams will participate in an online discussion group/blogs /wikis and use online storage drop boxes. This IPS Online discussion group will provide an

easy way for the participants to communicate with each other as well as a repository of information on the project.

FORMATIVE/SUMMATIVE EVALUATION

The intent of the 9th grade PBL/Technology Project is to encourage and train 9th grade Integrated Physics and Chemistry teachers to incorporate PBL and technology integration into their science classrooms. As part of the evaluation plan, evidence will be collected regarding the effect of technology integration training and the degree to which it results in changes to classroom practice and teacher knowledge. The evaluation will address meaningful indicators of success and provide in-depth analysis of participant's progress. Specifically the evaluation will gather quantitative and qualitative information from various sources to measure the fidelity of the initiatives implementation and the effect of the training on the teacher practices. The evaluation will collect data on teacher acquisition of new knowledge and skills and the ways in which that learning affects teaching, with follow-up evaluation activities to verify expected benefits as well as unintended consequences of the project

Data Collection. The quality of the technology integration training will be evaluated through observations, participant surveys, and interviews with science instructors and coaches, including:

Professional Development Observations: The evaluation design will utilize observations to assess the extent to which participants benefit from technology integration training.

Participant Surveys and Content Experts Interviews.

Site Visits: Surveys will be statistically analyzed for the purpose of comparative, profile, and descriptive analysis across and within schools. When appropriate, descriptive statistics, correlation analysis and analysis of variance techniques for non-parametric data will be utilized to uncover any predictive insights, group profiles, and group differences among and between identifiable groups of participants. Qualitative method will be used to analyze and present data from site visits and interviews. This will include information regarding unintended outcomes. Content analysis of qualitative data will be conducted using open coding and axial coding. Open coding entails the initial breakdown of raw text into discrete conceptual categories that identify a particular phenomenon. Axial coding, systematically linking categories to causal conditions, context action/interaction strategies, and consequences, will be used to determine emergent themes.

Evaluating the effect of technology Integration: To answer the impact question, evaluation activities will gather evidence related to: 1) Learning that can be attributed to participation in the science program utilizing problem-based learning with technology integration, and 2) Changes in student achievement associated to changes in classroom practices. Matched comparison schools from the Indianapolis Public Schools system will be used to evaluate the degree to which changes in student achievement can be attributed to the 9th grade science project.

Data Collection: Evaluating the impact of technology integration and professional development training will be conducted through pre and post test assessments, including:

Student Achievement: Pre and post test data will be gathered to determine the extent to which learning (i.e. knowledge and information gains) can be attributed to participation in this initiative. The benchmark science test (Acuity) will be administered four times during the year to students in both treatment and comparison school classrooms. Comparison schools will be selected from similar schools within the Indianapolis Public School system.

Teacher Based Assessments: The evaluation will also consider additional teacher-administered assessments that provide evidence of student learning aligned with state standards not covered by the benchmarks.

Data Analysis: Data collected from student assessments will be statistically analyzed for the purpose of comparative and descriptive analyses across and within schools.

LOCAL MATCH

\$71,600

Many in-kind contributions will be contributed to this project. IPS has recently purchased hardware from the stimulus fund. The district and school will use the following to supplement the project.

Ipods:	10%= \$2400
Laptop to make a full class set	10% = \$37,500
Distance Learning content	100%= \$1500
Salaries	
Science Content Director	1@10% = \$9000

Science Facilitators 2@10% = \$13,000

District Technology Director 1@10%= \$8200

PARTNERSHIPS

Non-Public partner schools - Ritter High School, Trinity Christian School, and Providence Cristo Rey High School

Center for Interactive Learning and Collaboration (CILC)

This non for profit worked with IPS on two previous grants. The Tech-Know-Build initiative and the One-to-One Science Project have been successful largely due to IPS's partnership with the Center for Interactive Learning and Collaboration. CILC will help this project incorporate distance-learning technology for professional development and student-led PBL investigations.

Contact Person: Monica Cougan, Director, Center for interactive Learning and Collaboration

City of Indianapolis

The City of Indianapolis is another important partner, since students work on "driving questions" framed with the help of experts in their community. Various city departments will provide information, coaching, and support student investigations during problem-based learning units.

Marion County Coroners Office & Forensics Department

Contact Person: Joyce Carter

Marion University, Indianapolis, IUPUI, Purdue University

I-STEM partners

Purdue University Freshman Engineering Partners and EPICs Program

Contact Person: Pamela Turner

Indianapolis Marion County Public Libraries

The Learning Curve © Central Library is a high tech, high energy, hands-on information environment designed for students. The Learning Curve © the Indianapolis-Marion County Public Library is taking a leadership role in developing a new educational model for the informal teaching of information literacy skills. The Curve is an exciting learning laboratory where students can develop these vital skills as they explore, imagine and invent in a unique space designed just for them. Computers, iPods, digital games, cell phones, and the Internet - these inventions are the tools that our children use to communicate and inform themselves about the world. In the Learning Curve students have access to an entire "tool box" of high-tech resources: laptop computers, digital cameras, programmable robotics and a variety of multimedia software. Through real and virtual activities students have the opportunity to use technology in productive ways that reinforce basic information literacy skills. For example, using a computer, synthesizer and digital camera, they can make their own digital books, songs, photos or videos. They can then share their creations on the plasma screen with other visitors in The Curve or add them to virtual Curve World "galleries".

Collaboration between teachers, parents, and students.

Experience with the US Department of Education Challenge Grant Tech-Know-Build and Title II D One-to-One Science Project suggests that, when students are working on real community problems and creating presentations, parents and extended families will become engaged as resources with information and contacts. The students themselves are the best promoters of parent involvement. IPS will use a mix of traditional approaches (newsletter articles and parent events) and technology-based approaches (television and IPS online) to communicate with parents and invite their participation. This grant will endeavor to assist parents in developing their own scientific literacy through a number of workshops, taught by their children's teachers, and events where they can learn about and celebrate their children's achievements.